The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. XLIX
No. 1254

SATURDAY, JULY 10, 1943
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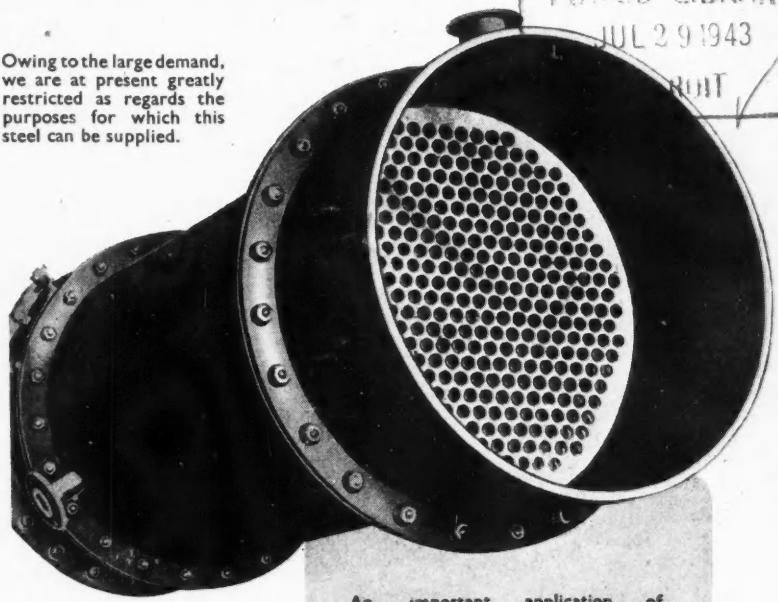

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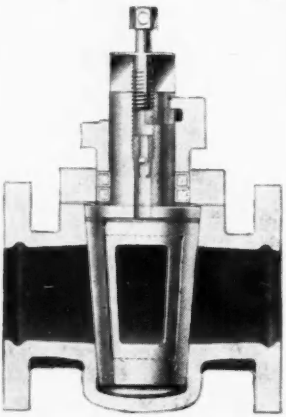

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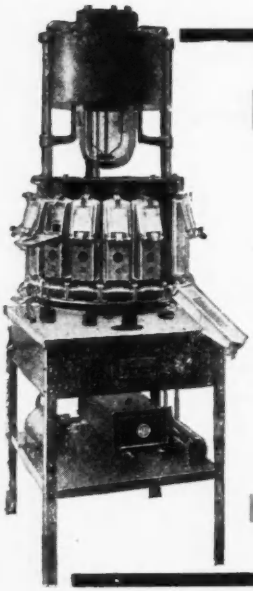

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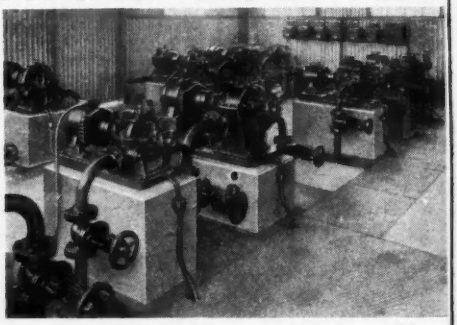

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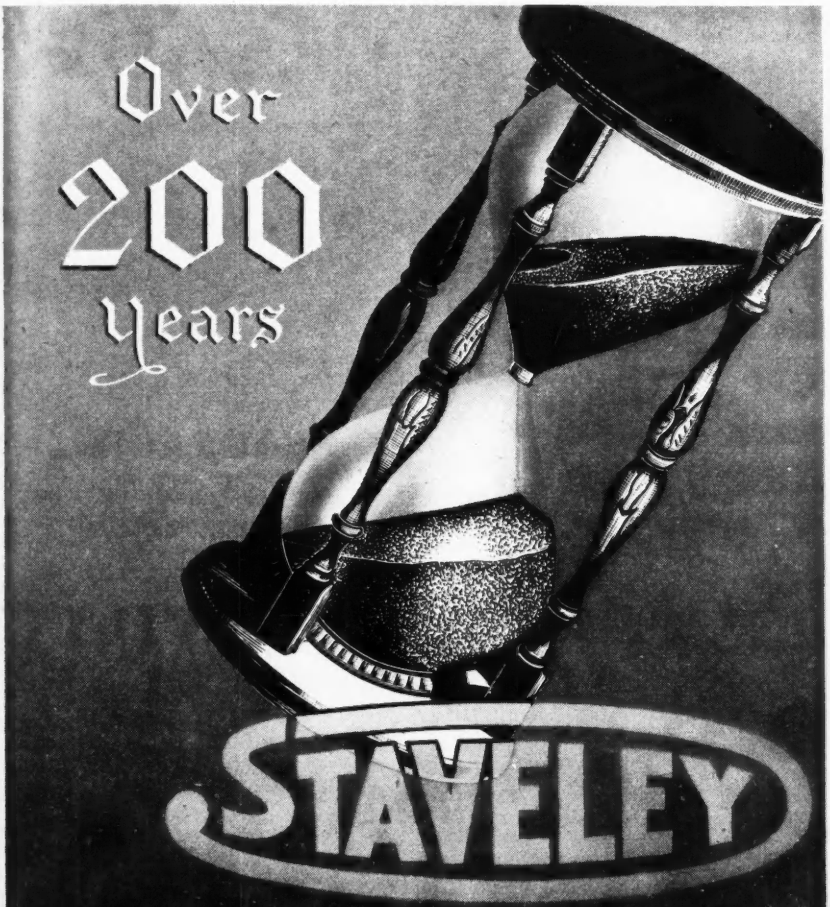

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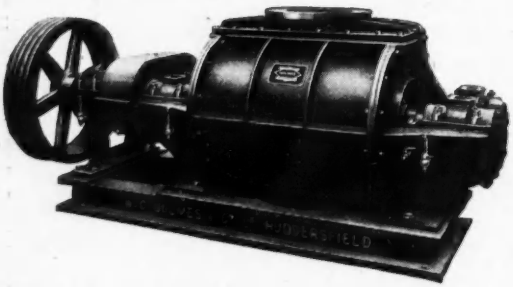

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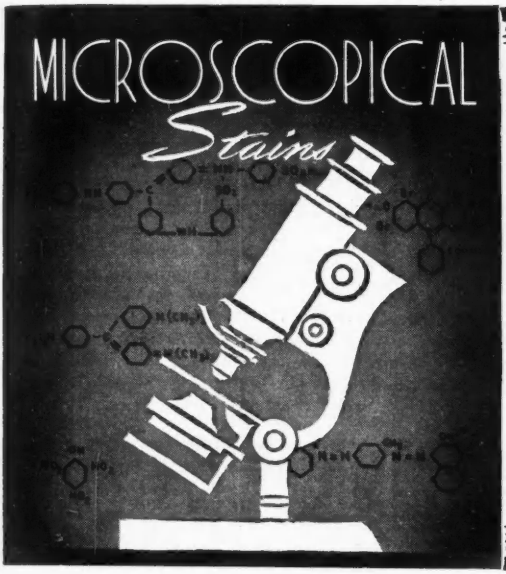

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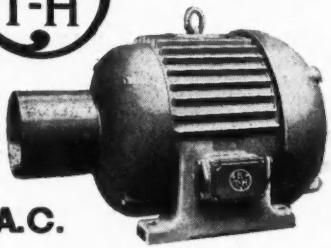

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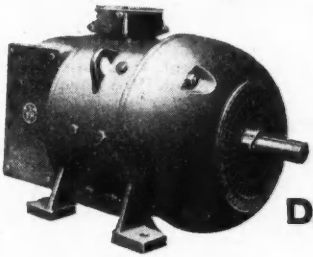

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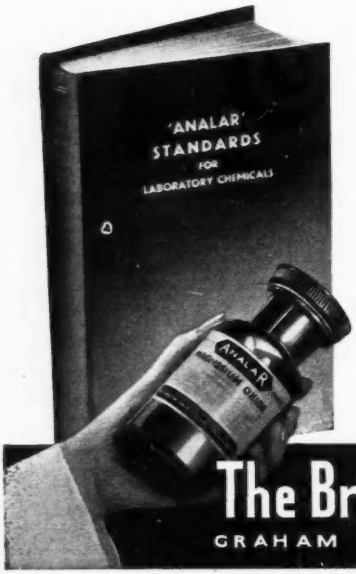

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VOL. XLIX
No. 1254

July 10, 1943

Annual Subscription 21s.
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Taxation and Obsolescence

THE debate on the second reading of the Finance Bill in the House of Commons provided interesting material on the subject of obsolescence allowances. Members generally agreed with the necessity for continuing heavy taxation after the war, and the statement was made that income tax would not in our time come below 7s. 6d. No one appeared to question this important matter of the level of taxation, and before dealing with the specific industrial problem it may not be out of place to say a word on the general question of taxation. Everyone will agree that our primary need will be to provide ourselves with the wherewithal to live and to maintain a reasonable standard of living, having regard to the present state of technical development. It is, therefore, necessary to provide ourselves with the finance to purchase whatever is needed. As a predominantly industrial nation, and not a very large one numerically at that, we must export goods and services if we are to maintain ourselves.

Industry can look at this problem from two angles. In the first place it must have customers. The people of Great Britain are, and probably always will be, the best customers of British industry. If the incomes of our customers are so taxed—as they are to-day—that purchasing power is unduly limited, industry will wilt because there is no sale for its products. That happened during the Great Depression and it seems that our financial experts have not yet learnt their lesson. High taxation levels must inevitably lead us back into trade depression, and we suggest very seriously that new methods of looking on this problem of taxation and public expenditure are necessary. The second way in which industry might regard the subject is from the angle of its own costs. Industrialists are always endeavouring to reduce their costs. In the ultimate analysis, products of industry are bought by the people employed by industry out of the wages they earn in industry; investments come from the same source, the word "industry" being used to cover every form of gainful occupation. Therefore, unless the population of these islands earns enough to buy goods, industry must reduce its output. This means that unless the net wages received after the payment of taxes are high enough, we can never be prosperous. Fundamentally, therefore, since no one can earn money except by doing some form of work, or getting

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N_2O by Neil Nettleton

"Give us the plant, and we will win the peace for you."

someone else to work more skilfully for them, all taxation must be paid for by industry either through higher wages or in direct taxation. For these reasons we deplore this suggestion that the rate of income tax must remain fantastically high. We shall prosper in proportion as it is reduced to reasonable levels.

Industrialists feel that the present method of taxation is not operating in the national interest, but unfortunately there is so much specialisation to-day that the financial expert knows little or nothing of industrial development or management. He does not know how new industries are developed through research from the laboratory to the works, via the pilot plant; he does not understand that new discoveries and new processes demand new methods, improved plant and perhaps a complete supersession of existing plant long before it is worn out. Other nations, wiser than we, have long recognised this fact, and the taxation system of the United States, for example, is designed to assist industry in this respect. In the opinion of those competent to judge, British taxation methods tend to make British industry stick to obsolescent machinery because the cost of replacing it is too great. We patch up old factories that should have been scrapped and rebuilt, and thereby perpetuate squalid zones of slum factory areas. The higher rates of taxation to which many M.P.s appear to look forward are likely to accentuate this tendency. If British industry is to keep its place, it must, in Sir George Schuster's words, "be progressive, adventurous, inventive, and flexible—always bold to risk expenditure on research and experiment with new methods, always ready to scrap and replace obsolescent machinery." A characteristic difference between our business methods and those of the U.S.A. has lain in the greater readiness of the Americans to scrap old plant and buildings and to design new processes and new factories. Here, if a

pilot plant is to be erected at a cost of say, £100,000, this cost is not allowed as an expense by the revenue authorities and it is thus necessary to spend £200,000 on the experiment; can it be wondered that we are not as progressive as some other nations? Can it be a matter for surprise that in Britain the industrialist demands that the inventor shall show him an existing plant operating well before he will place an order for one?

There is however, some prospect of a change for the better after the war so far as concerns the burden of direct taxation on firms, and it is up to industry to put forward a really strong case. Sir Kingsley Wood has announced that this subject is now under review by the Inland Revenue and the Board of Trade, and that a detailed investigation is being made in consultation with industrial bodies as a matter of post-war policy. The Federation of British Industries, the Association of Chambers of Commerce, and other bodies are taking part in this investigation. One important point made in the debate by the Financial Secretary to the Treasury, Mr. Assheton, was that when it is found desirable to scrap a plant in order to replace it by a better one, the Inland Revenue does not now make it a practice to insist that the plant that is being replaced should be replaced by the same kind of plant. Another very important statement of his was that "The Government recognises that it is vitally necessary that industry should be in a position after the war to find the expenditure which will be involved."

Unfortunately, these developments have been restricted by the general attitude of the Treasury, which is generally regarded with some justification as the department of Government most wedded to out-of-date methods. It is the embodiment of the financial mind—the Bankers' mind to which reference was made in our leading article of May 29. Mr. Assheton went on to say: "I suggest that the proposal has to be examined in the light of four main considerations: The industrial interest of the community; the practicability; the needs of the Exchequer—which can never be overlooked by any Chancellor of the Exchequer; and . . . equity." The tendency will be from the Inland Revenue side to place emphasis upon the practicability and the need for raising the money that the Chancellor wants. We hope the view will prevail that the prosperity of industry must be the main consideration. Unless it is so, there will be no revenue from any source whatever.

NOTES AND COMMENTS

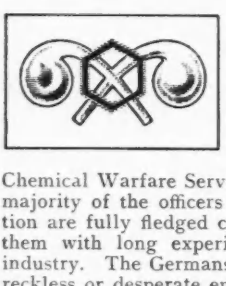
Rebuilding Russia

INCREASING support is being given by thinking people to the formulation of measures, here and now, for the rehabilitation after the war of the countries that have suffered from the depredations of Germany. In a recent issue we reviewed Dr. Geoffrey Bourne's book on the food position in Nazi-bound Europe, with its illuminating statistics; and now Mr. Norman Neville, who knows a good deal more about Russian industry than most people in this country, has reminded us, in a *Times* article on Trade with Soviet Russia, that a vast acreage of the most productive territory in Russia has been completely devastated, so that the Russian people will certainly require, and surely have a right to expect, our economic collaboration when victory has been achieved. As Mr. Neville points out, the Soviet Government deliberately sacrificed the comfort of a generation (fortunately for the cause of the United Nations) in order to build up an industrial system capable of producing the munitions required for a modern war, while they regarded export trade as a necessary evil, almost, valuable primarily as a means of paying for essential imports. The Soviet authorities are now convinced that we are able and willing to play a vital part in the overthrow of fascism; and this growing confidence, added to the need for rehabilitation of the devastated areas, opens up a vast prospect of trade, provided that the Russians are satisfied that effective means of security against aggression have been concerted. The fact that there are few if any private vested interests in trade with Russia is an added advantage, because any new measures of trade promotion can be of a national complexion. Such measures should be put in hand at the first oppor-

tunity, and detailed schedules drawn up of what supplies the Russians are likely to require. Every spur should be applied to urge our Government to official and responsible action.

U.S. Chemists' Badge

IF in your travels you should happen to meet an American soldier wearing the badge represented in our sketch, you should take him to lunch. You should find much in common to talk about, for the crossed retorts and the benzene ring are the insignia of the American Army Chemical Warfare Service, and the great majority of the officers of this organisation are fully fledged chemists, many of them with long experience of chemical industry. The Germans, if they are ever reckless or desperate enough to resort to the use of chemical weapons against American troops in the field, are likely to meet with some nasty surprises; the retaliation of the men with the crossed retorts will be swift and devastating, for the U.S. Chemical Warfare Service is second to none in efficiency and inventiveness. Another factor which should deter the Nazis from taking any action that would unleash a chemical Nemesis is the fact that behind America's front line chemists stand the almost limitless resources of the world's biggest chemical industry, capable of producing all the incapacitating gases in overwhelming quantities.



Universal Abstracts

THE possibility of improving abstracting services was discussed in one of our recent leaders. We pointed out the danger of losing the valuable grains of research under the tons of chaff produced in the enormous quantities of scientific literature published. The report of the British Commonwealth Science Committee contains some interesting remarks on the subject of rationalising abstracting and other scientific information throughout the English-speaking world. The committee bases its arguments on a sound foundation by describing the useful functions performed by two bodies, the Imperial Agricultural Bureaux and the Bureau of Hygiene and Tropical Diseases. The former, for instance, comprises a group of twelve centres for the collection, sorting, indexing, and abstracting of world scientific information on twelve branches of science—such as dairy science, forestry, and insect pests—which have a bearing on agriculture. All these centres produce an abstract journal which is sold all over the world, so there is now no need for the scientific communities in the different countries to waste time by producing their own set of agricultural abstracts, which would represent mere duplication of effort. In the field of chemical abstracts we have one set produced on this side of the Atlantic, the chemical section of the *British Chemical and Physiological Abstracts*, while in America another set is issued under the auspices of the American Chemical Society, to a large extent duplicating the work done here. Similar duplication occurs in physical science. The committee suggests that with the rapid extension of civil air transport after the war it should be possible to have one set of jointly prepared abstracts which could be published simultaneously in America and Britain.

Personal Planning

THE case for private enterprise against state planning in industry was put in a nutshell in the following letter just published in *The Daily Telegraph* from Sir Ernest Benn, President of the Society of Individualists: "One of your correspondents, Mr. Edmund Quarry, is good enough to refer to my business activities and ask, 'Did Sir Ernest plan?' Of course he did. He planned himself, not others; planned to pay taxes, not to spend them; planned to use persuasion, not power; planned to give satisfaction to others (both customers and workers, all of whom were absolutely free to accept or reject his plans). He planned to be an Englishman, and not a totalitarian, and thus did no more than other independent Britons. There are millions of competent planners on our island and nothing less than the full and free force of all of them can save our civilisation. May I reply to Mr. Quarry with a question? 'What would have happened to Sir Ernest had he been planned?' "

The Chemical Work of the Factory Department*

An Aspect of the Industrial Health Report

A REPORT of the Proceedings of the Conference on Industrial Health held last April at the Caxton Hall, Westminster, has now been published by H.M. Stationery Office. For the modest price of 1s. 6d. a great deal of interesting and important reading matter has been made available. Of this the most important from the point of view of the chemical industry was the contribution by Mr. S. H. Wilkes, H.M. Engineering Inspector of Factories, a contribution which, in addition, has the merit of being extremely readable.

Mr. Wilkes announced that he was not there to discuss the future. " I am here to tell you of the present, and a small part only of that," he said. " I am here to try and tell you what the Factory Department is doing at present. There has been much talk, at this Conference, about environment. I am going to try and show you how the factory inspector looks at some part of the man's environment, and what he does about it. The Chief Inspector has asked me to deal with one small area within the outline, the chemical area, and he has asked me to fill in that area because I am a chemist, although my official title makes me an engineer, which I am not.

Extent of Chemical Dangers

" That which we call chemical processes and chemical dangers are not, of course, confined to what is known as the ' chemical industry.' They extend rather further. Girls working in a small milliner's workshop, you would say, are not exposed to chemical dangers. They are not, as long as they stick to their needles and thread, but when they begin to mess about with cans of hat varnish and cellulose cement, and the like, containing Heaven alone knows what witch's brew of inflammable or poisonous solvents, then, indeed, they may encounter chemical dangers. There is not one of you who has not spent a few minutes in front of a small dry-cleaner's window, watching the girl operating the plant there, but did it occur to you that, if anything went amiss with that process, there were all the ingredients there for chemical injuries of the most serious nature? And you may take these words quite literally. Then, at the other end of the scale, you meet that leaky labyrinth full of poisonous, explosive gases, the blast furnace. Between these two extremes, there is hardly a trade of which you dare say categorically, here and now: ' Chemistry has no place here.' And if you were right to-day, you would probably be wrong this time next week.

" The first question the chemist asks himself when faced with a chemical danger is always, ' Must this dangerous material be used? ' Is there no safe substitute?' The Chief Inspector himself gave you several examples of how such substitution had been carried out, and we chemists are rather pleased about a little substitution we have arranged recently. The Federation of Dry Cleaners has agreed with us that regulations shall be made prohibiting the use of any inflammable spirit with a flash point below 95°F. In order to appreciate the value of that agreement, you must have investigated some of the ghastly results of petrol fires. But, when all is said and done, you have to face the fact that dangerous chemicals must be used; and the second question the chemist asks himself always is, ' How much?' Lord Kelvin (or was it Lord Rayleigh?) said that he understood a phenomenon when he could measure it and when he could describe it in numbers. On our lowly plane we copy that high example. We strive to measure our dangers and to prescribe the precautions in numbers. Sometimes we cannot get the numbers we need; sometimes we can get the numbers, but we have not the wisdom to use them aright.

Industrial Explosions

" Chemical dangers fall broadly into two great groups—explosions, including fires, and poisoning, in the widest sense of the word. Leaving out of the question the true explosives themselves, I wonder what picture you have in your minds of industrial explosions. The worst of recent years happened about 2½ years ago in Scotland, in a strongly built factory, half of which at least was split from top to bottom, 18 people were killed outright and very many more injured. Unhappily, in Britain to-day, that of itself could not cause consternation, but you may be a little startled when I tell you that the ' explosive ' that caused that dreadful havoc was plain starch. Among the others of the worst explosions we have had in recent years, have been two caused by cotton-seed dust, each killing six men and shattering a factory, another one from coal-dust killing 11 men. The worst of our industrial explosions are not, as most people believe, caused by gas and vapour explosions; they are from these common solid materials. I do not mean, of course, that the lumps of sugar

* From the Report of the Proceedings of the Conference on Industrial Health, by permission of the Controller of H.M. Stationery Office.

you used to have in the bowls on your breakfast tables might have gone off 'bang' at any moment. The conditions are rather special. The stuff must be ground to a fine dust and mixed as a cloud in the air, and then ignited, and in that case it is as violent as gas or vapour; it has, in fact, greater violence, because a dust cloud, at its optimum (or should I say 'pessimum'?) concentration, contains more explosive material than most gas or vapour clouds.

"What about those figures I was talking of? We are coming to them, although I shall not trouble you with many of them. Explosions must be dealt with on a quantitative basis. Not every mixture of air and inflammable material will burn. For every material there are two critical limits, above which and below which you are safe, because the stuff will not burn. A mixture of air and hydrogen, say, containing less than 4 per cent. of hydrogen will not burn; if the hydrogen is above 75 per cent. it will not burn. That is the first principle upon which the man handling explosive vapours always bases his safety precautions. Take a case in point, a man who is making a waterproof cloth. He puts his cloth through a trough, or over rollers, which spread over it the inflammable solution, and then passes the wet cloth through a big drying stove. He dare not allow an inflammable mixture to occur in that stove; he must arrange to keep outside the inflammable limits. Of course, if he did not, we should help him. Even when he does, he has often another problem. He keeps below the inflammable limit, but he does not want to keep too far below, because he must recover that solvent vapour. It is not economically possible to recover the vapour from very dilute mixtures, so he must decide upon yet another limit, and he must lie between those limits of concentration. There are numerous pieces of apparatus, very ingenious, for ensuring that.

Magnesium Grinding

"This, perhaps, is a bit technical, dealing only with broad principles. Let us get down to something more intimate. Let us turn to dust explosions, and I shall give you a short, nutshell history of the grinding of magnesium in Great Britain. It started a few years before the war, and from our knowledge of other dusts, particularly from our knowledge of aluminium, we knew there was bound to be trouble. Plans were brought to us, and we looked at them. The manufacturer said that he would rely for safety upon keeping the magnesium powder below explosive concentrations; he would put through the grinding plant so much air that inflammable mixtures would never be formed. He was telling us! You cannot treat dust as you can treat vapour. There is a lower concentration limit, that is true, but dust is different from vapour in this way, that you can mix vapours evenly, and you know that your concentration throughout the mixture will then stay put. But dusts are just the opposite; they are hard to mix and they will begin to settle out as soon as they are mixed, so that we do not put our trust in lower concentration limits for dust. More than that, if you are grinding material to a dust, sooner or later you are going to separate the two phases by means of some sort of dust separator, that will deliver pure air at the top and pure dust at the bottom; somewhere in that separator the dust must pass through the inflammable range, so that you must assume that your dust plant will have an inflammable mixture in it, and you must take precautions accordingly. We urged various shielding devices for that plant, but they were refused, and so we had to be content with assuring ourselves that the known dangerous parts, the cyclones, where the dust was separated, were to be outside the factory. There they very soon blew up, and then, before long, another plant, of which we had not known beforehand, blew up and lost its cyclones and its mill. On both occasions, fortunately, the injuries were very small, but at that stage, of course, we had to take action.

Use of Inert Gases

"If you grind dust in air, I have said that you must expect to get inflammable mixtures, but if your material is very dangerous it may well pay you not to grind in air, but to choose some gas in which the material will not burn. There are plenty of such plants in use, flue-gas plants for coal, carbon dioxide plants for aluminium, and the like. Magnesium was more difficult, because magnesium will burn freely in carbon dioxide. You think next of nitrogen, but undoubtedly magnesium can combine with nitrogen. Rayleigh and Ramsey made use of that very property in their isolation of argon. On chemical grounds, argon itself would be ideal for the purpose we are considering, but it was then, and is still, too costly to be used on the scale contemplated here, though it has been used on a smaller scale in the grinding of a material still more vicious than magnesium. Still, nitrogen, on chemical grounds, would not combine with magnesium anything like as violently as oxygen would, and so we urged the firm—we went on our knees, with tears running down our cheeks, and urged them—to investigate nitrogen before committing themselves to any other system, but they would not. The Chief Inspector mentioned, and I wish to repeat here very, very clearly, that the factory inspector can enforce the requirements of the Factories Act, but he can enforce nothing else at all. Nitrogen was refused, and so we could do nothing about nitrogen, but clearly we could not sit back

and just twiddle our thumbs, waiting to tell the Coroner that it would not have happened if our recommendations had been followed.

"It may perhaps be best not to look too closely at what the Act did allow, but we insisted that the whole of the plant which we knew was going to blow up should be locked up and screened, and the men locked out, so that when the explosion did occur, at least the men should not suffer. We could perhaps have enforced that under the Act; I will not go into the details of the section, but it was not quite a straightforward case. Happily, it never came to a question of that. The firm agreed to do it, and since then there has been no trouble about it; it is now standard practice in magnesium works, and although we have had explosions in magnesium works doing grinding, no one has suffered more than a trivial injury from the explosion of grinding plant. You see how difficult it is. Even where the solution clearly stares us in the face, unless the Factories Act insists upon it, we can do no more than persuade, and if our persuasion is rejected we have to wait until something happens. So that next time you are in a company discussing an industrial accident, and someone asks, as he will ask, 'What was the Factory Inpector doing?' remember the history of magnesium grinding. Say to him of accidents what Darwin said of coincidences, 'We hear very little talk of those that do *not* happen.' But that is not the end of the story of magnesium. When war came, it was considered that the loss of plants by explosion would have to be prevented at all costs. Research could be undertaken then, and was undertaken, and it was proved that nitrogen provides a safe way to grind magnesium.

The Need for Cleanliness

"Any inspector lecturing on dust explosions is somewhat in the position of Cato, the Roman senator, who, whatever his speech was about, always finished with the warning, 'Carthage must be destroyed.' No inspector dare make a speech about dust explosions, and not give a warning about one very special danger. When a dust explosion happens in a factory, it usually bursts open the plant casing somewhere, and the flames that come out may burn someone, or, in the more stately language of the official document, 'the issuing flames may impinge upon some person.' That is bad enough, but it is very well if it is no worse. It will be no worse if the room outside the plant is clean, but if the room outside the plant is dirty, if dust has been allowed to collect, and if the little puff of the explosion from your plant blows up that outside dust into a fine cloud and fires it, then you have the explosion that splits your factory from top to bottom and kills your men by the half dozen. Constant cleaning is the one safeguard, and vacuum cleaning is the only appropriate method. We shall try to make that a legal requirement after the war. In the meantime, keep your plant as dust-tight as you can, and fit hoods, with mechanical draught, at feed points and discharge points, where dust is always liable to escape. Well! that is our Carthage—those heaps of dust that have been allowed to accumulate gradually on window-sill, on beam, girder and plant-casing—ugly, untidy, deadly, little heaps. So much for explosions, and now I pass to the other branch of my subject, poisoning.

Solvent Vapours

"Factory chemists are closely concerned with at least one environment of the workmen; it is an intimate and an important one—the air he breathes. It is part of the chemist's job to make sure that the air is fit to breathe, and that the man is not breathing slow poison, or even quick poison.

"Sir Edward Mellanby, when speaking of two particular dangers, stated that the psychological danger vastly outweighed the danger he foresaw from solvents. For me to criticise that thesis, or even to discuss it, would be a gross impertinence, because I know nothing about psychology, but I am obviously bound to correct any impression you may have formed, mistakenly, that the solvents problem is not a real one or that it has been solved. This question came up some six or seven years ago, when the Factory Department called a conference of all the scientists and the doctors, at which Sir Edward Mellanby himself was present. One outcome of that conference was the suggestion that an immediate survey should be made of all the medical literature dealing with these solvents, and Dr. Ethel Browning was entrusted with that task. Her book is now a standard work of reference. If any of you can read a chapter of that work and get up feeling that there is no solvent danger, then he is a tougher man than I am. Dr. Browning has now joined our Department. She is no longer hunting out medical cases in the literature, she is finding flesh and blood cases of poisoning in the factories, and she has not complained of any lack of work. Indeed, we know there is a solvent problem. Solvents are dangerous and the problem is not solved yet. We know it, and we know for the very good reason that workmen are still being poisoned by solvent vapours.

"General Baylay would be startled if he thought anything he had said had misled you, but it probably has, because you might suppose from what he said, and I have no doubt you did suppose, that rubber manufacturers do not now use benzol as a solvent. That is not correct. Benzol is being used as a solvent to-day, and people are being poisoned by benzol vapour to-day be-

cause of that use. But let us be fair to the employers. When they are buying solvents to-day, unless they inquire from the makers, they may not know what solvent they are getting. It is no longer possible, in fact, to pick and choose your solvent as you did before the war. Benzol is very widely distributed in modern solvents, and anyone using a modern solvent should in common prudence satisfy himself, from his supplier, either that it does contain benzol, in which case he should take the proper precautions, or that it does not.

Silica Dust

"It is part of the chemist's job to satisfy himself that the air the man is breathing is fit to breathe. He will do that, of course, by samples and analyses and, as far as the chemist goes, there is no trouble with vapours, gases, and the like. Dusts present more serious difficulties. Our own physicist, Goodall, who has worked very largely on dust, has issued repeated warnings concerning modern microscopic methods of examining silica dusts. The figures obtained by such methods have not, really, the significance usually attached to them. Fortunately, that position may change soon; we have a great hope that it may. It is an important part of our duty to keep ourselves well informed concerning advances in scientific methods. We know that modern scientific methods may help us, and in this particular instance we know that X-ray diffraction methods would probably give us the answer we want. We are going to get it. Someone wondered what would be the outcome of Mr. Bevin's newly appointed Advisory Committee. I will tell you one outcome of it, and it took five minutes to get it. Our problem of dust was put to that Committee by the Chief Inspector when it met last week. He was supported by the Government Chemist, to whom we turn like frightened children when we are in chemical trouble, and he never refuses his help. The Chairman of this Council requested the Government Chemist to find the solution for our Chief Inspector as soon as he could, adding that the question of means was not to stand in the way. Practically speaking, the Government Chemist was given a free hand, and invited to get on with the job, and he did.

"We can measure the amount of poison in the air, but what are we to do with the figure? We go to the medical literature to find out the maximum amount a man can be allowed to breathe, and we come away bewildered and disheartened. Figures there are in plenty. There is hardly an authority in the world that has not quoted figures, but they do not agree among themselves. The figures are all different, and they differ by large amounts; one authority will quote you ten times as much as another. A chemist cannot work with that sort of standard. In passing, may I say that several countries have laid down statutory limits for poisonous vapours, and my heart had warmed to Russia long before 1941 for I found that Russia was setting her poison limits at least twice as low as any other authorities.

"It is easy, of course, to grumble at these figures, but we ought to look at some of the difficulties of the pathologists in getting them. The pathologist has to work first with animals, and later with men, and idiosyncracy comes in, and is in itself a bigger factor of uncertainty than the physicist or the chemist usually meets in his whole lifetime. When the pathologist comes to compare his animal results with the actual human cases within his own experience, these latter are all too few upon which to form a conclusion. Recently, I heard a story in this connection, a story that I accept with very great reserve. I was told that a published paper, dealing with some rare disease, contained the following passage: 'The average age of death from this disease is 48. Two cases have been recorded, one a girl of two, and the other a man of 94.' What the pathologist finds in his laboratory will have to be checked by long-term observations in the factories, the doctor examining the patients, and the chemist examining the conditions. Quick research can show a material to be poisonous, but what research is going to prove it harmless? Medical science, I take it, is like all other sciences. As your means of diagnosis become more refined you will detect changes that you could not have detected before.

Safety Cupboards

"Of course, we cannot be happy to work with such figures as the poison limits mentioned above. We have little confidence in them. So we approach the matter in an entirely different manner. We do not say, 'How much can the man breathe of this poison without injury?' We say, 'He shall breathe none. If you are dealing with this material, deal with it in a totally closed space, so that none of the poison escapes. That is not always possible. In some cases the man must handle the stuff, and he cannot handle it in a totally closed space. In such cases, put the material in a partly closed cupboard or cabinet, call it what you like, with a small opening in the front so that the man can reach in to do his work. Fit your cupboard with a fan and chimney, so that a strong current of air is drawn from the workroom into the cupboard, and then blown to the open air outside your factory. No poison can then get back from cupboard to workroom and the man is quite safe.' That is a cardinal article of faith with all factor inspectors; with me it amounts to almost fanaticism."

Notes on Poison Gases

I. The Action of the Respirator Canister

by W. J. G. DAVEY, B.Sc.

ANY consideration of war gases involves also the methods taken to combat them. The earlier types of respirator relied on chemical action for their efficacy: thus, the first official respirator used by the British in the last war consisted of a gauze pad soaked in chemical solutions. This was followed by a flannel helmet similarly impregnated. Mixtures of sodium carbonate, sodium thiosulphate, and glycerol were used to destroy chlorine, phenate solution being added later as an antidote to phosgene. The multiplication of war-gas types could not be dealt with effectively by additions of more and more chemicals, and a box-type respirator, based on physical methods of poison-gas retention, was developed—the prototype of the modern respirator. Chemical action is still made use of in some industrial respirators, for example, the "Universal Gas Mask," as developed in the U.S. Bureau of Mines, has a canister of granular absorbents consisting of activated charcoal for removing organic vapours; a filter of cotton wool to remove smokes, dusts, and mists; caustic soda fused on pumice stone to neutralise acid gases; another cotton wool filter; fused calcium chloride to remove moisture that would inhibit action of the next absorbent; a mixture of the oxides of manganese and copper ("hopcalite") with, sometimes, silver and cobalt, which catalyses the oxidation of carbon monoxide to carbon dioxide; and finally, silica gel for adsorbing ammonia. The mask and harness weigh about 8½ lb.[1]

Considerations of weight and cost would preclude the adoption of such a respirator for military and civil defence use, and a mask which relies upon the physical properties of filtration and adsorption alone has been standardised. The first box respirators incorporated canisters filled with activated charcoal for the removal of vapours, *e.g.*, chlorine, phosgene, etc. The Germans then introduced arsenical smokes as mask-breakers, so merino wool filters were added, and the resultant respirator has proved successful against fogs and smokes as well as vapours.

Physical Classification of Gases

A poison gas is defined as any chemical used in warfare because of its harmful properties and may consist of chemicals in the solid, liquid, or gaseous state. Four types of gas are therefore recognised in chemical warfare, and these are shown in Table 1.

Solids are encountered as smokes, which consist of minute solid particles suspended in the air or other gas, and liquids as tiny drops of liquid similarly suspended. They are retained by trays of the absorbent merino wool, mixed with asbestos to prevent clogging. This filter proved quite satisfactory for the sizes of particles produced in smokes and fogs during the last war. It

TABLE 1

Type of Gas		*Action of Respirator*
Solids (smokes) Liquids (fogs)		Filtered by merino wool.
Gases	Vapours	Adsorbed by activated charcoal.
	Permanent Gases	Pass through the respirator.

will be appreciated, however, that the disintegration of a solid by explosion, for example, results in the formation of particles of various sizes. "A fog (smoke) formed by a shell filled with diphenylarsine chloride, contains particles of the following diameters, and a special filter would retain only the following percentages of these particles.

Diameter of particle in m_μ	Percentage of particles penetrating the filter.
50	52.4
50-100	87.6
100-200	93.9
200-400	30.4
400-800	4.2
800	0.0

"The modern development of gas warfare aims, therefore, at producing a fog which would either penetrate or obstruct the filter of the enemy. As the physical limits between which this can be done are known, every army is able to construct protective filters against every special type of fog, but there is no universal filter for fogs."[2]

It must be remembered that the aim of the filter is to prevent harmful concentrations of the gas from passing through the respirator, and if the bulk is absorbed, the remainder, low in concentration, may have no effect upon the wearer of the mask. The exploitation of smokes of such size that the present filter would prove ineffective would be speedily followed by the adoption of a different filter. In this regard it is of interest to note that while we were taken by surprise in the last war by the use of arsenical smokes, within a very short time effective filters had been prepared and incorporated in our respirators.

Adsorption

Vapours are removed by adsorption through the medium of activated charcoal. The phenomenon of adsorption has been described as due to the liquefaction of a gas

and its retention by capillary attraction on the surface of the pores of the adsorbing solid. In so far as adsorption *is* due to liquefaction this phenomenon can only apply to gases below their critical temperature, *i.e.*, below that temperature above which it is impossible to liquefy the gas. Hence, the higher the molecular weight and the lower the volatility of the gas, the greater its tendency to adsorb. It will be shown in the next article that the volatility varies as the product of the molecular weight and the vapour pressure. We thus have

$$A \propto M/y \quad \text{..... (i)}$$

and $y \propto M \times P$ ..... (ii)

where A = adsorption, M = molecular weight, y = volatility, and P = vapour pressure.

From (i) and (ii) we have

$$A \propto 1/P \quad \text{..... (iii)}$$

The lower the vapour pressure, therefore, the greater the tendency for adsorption.

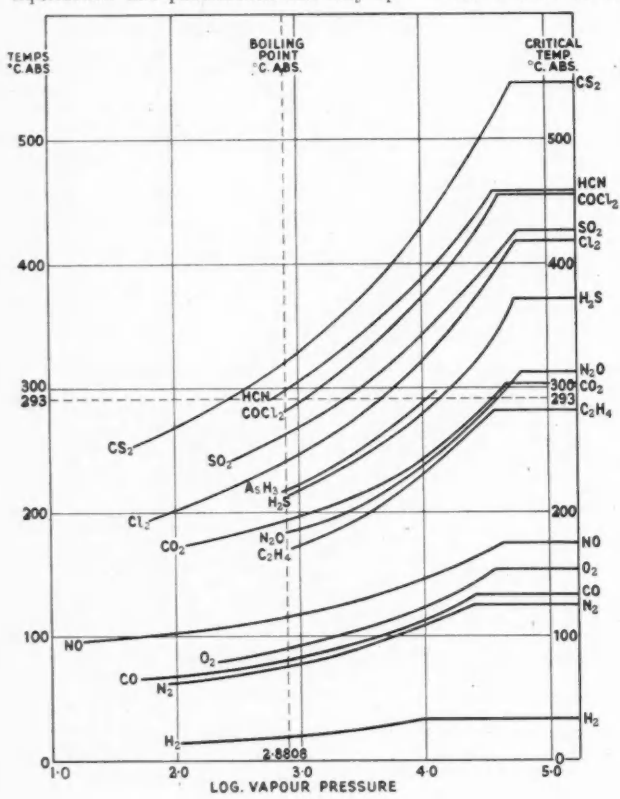


Fig. 1.

Fig. 1 shows the relationship between vapour pressure and temperature for various gases, and includes on the right-hand side a chart of critical temperatures. It will be noted that the critical temperatures of ethylene, nitric oxide, oxygen, carbon monoxide, nitrogen, and hydrogen are below 293° Absolute, *i.e.*, below the normal atmospheric temperature of 20° C., while the critical temperatures of carbon dioxide, nitrous oxide, chlorine, etc., are above this figure. The former are classified as permanent gases and the latter as vapours, adsorbable by activated charcoal. The figure also shows that the vapour pressure curves are in the same order as the critical temperatures.

Under the heading "Selective Adsorption" it is stated[3]: "So important is the effect of volatility that it is frequently possible for a gas of low volatility to displace one of high volatility. Thus, if activated charcoal is brought into contact with natural gas, it adsorbs a certain amount of all the hydrocarbons of the gas. On the other hand, per unit partial pressure, the high-boiling constituents of the gas are adsorbed selectively, *i.e.*, far more completely than the low-boiling constituents. Furthermore, if this same charcoal is treated with additional gas, the high-boiling components of this second quantity of gas will adsorb on the charcoal, and, in order to do so, will, to a large degree, displace the low-boiling constituents already adsorbed. In this way a charcoal that has picked up from a gas relatively large quantities of methane, ethane, and propane, will, when treated with further gas, adsorb pentane, hexane, and higher hydrocarbons by displacing the lower boiling ones already picked up. This is the reason for the fact that by the intelligent use of activated charcoal in recovering gasoline from natural gas it is possible to produce a product relatively free from

gases of low molecular weight." The phenomenon of selective adsorption might, in chemical warfare, necessitate the changing of canisters at more frequent intervals.

Of the permanent gases, nitric oxide, in contact with the air, is oxidised to nitrogen peroxide, a vapour with critical temperature of 431° Abs., *i.e.*, above normal atmospheric temperature, and a vapour adsorbable by activated charcoal. Ethylene presents an interesting case, as its critical temperature, 282.7° Abs., is below summer temperature but above normal winter temperature. Such a compound might act as a vapour in winter and as a permanent gas in summer, but its high vapour pressure would militate against complete adsorption even at winter temperatures. The only poison gas among the remaining permanent gases is carbon monoxide, but there are several objections to the use of this gas as a direct poison gas: its lightness, its bulk (being non-liquefiable at ordinary atmospheric temperatures), and the high concentrations necessary for toxic or lethal effects. The modern respirator is therefore designed to eliminate all fogs, smokes, and vapours, while permitting the permanent gases, including the air, to pass through.

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1 KINGZETT, *Chemical Encyclopædia*, 1940. p. 429.
2 WACHTEL, *Chemical Warfare*, 1941.
3 WALKER, LEWIS, MCADAMS, and GILLILAND, *Principles of Chemical Engineering*, 1937, p. 439.

Australian Optical Glass

Lecture to Combined Chemical Societies

DESCRIBING Australia's war-time development of the manufacture of optical glass as a triumph of co-operation, Professor E. J. Hartung read a paper before a combined meeting of the Melbourne University Chemical Society, the Society of Chemical Industry (Victoria) and the Australian Chemical Institute on March 10. He paid tribute to the readiness of those entrusted with making the glass and to the practical interest of the workmen selected for the task.

Raw Material Problems

After dealing with the work of the technical committees, the tests and experiments, and the visit of two representatives from Australia to America, the lecturer said that Australia was not faced with the problem of the composition of glasses. There was no proposal to make special Australian glass. What had been wanted was optical glass of types produced in other countries so that Australia could readily repair broken parts of instruments that had been imported, and so that she could manufacture optical glass in conformity with those standards. Three main problems were raw materials, the composition of the manufacturing pots, and general furnace design and practice. The problem of raw material was easily solved because their already established glass industry had proved that they had sand of high purity. It was in furnace difficulties and problems in regard to stirring that the delegation to U.S.A. received the most useful guidance. The selection of the necessary types of clay was another problem, and the making of pots was for a time the main difficulty. Chemical resistance that would stand up to the melting of glass was essential, and in addition to chemical qualities thermal qualities were necessary. However, the search for the necessary clay had been successful.

New American Plastic

Derived from Giant Redwood Trees

A NEW non-critical thermoplastic of phenolic type, chemically perfected from the phlobaphenic (amorphous tannin) structures of the redwoods, is now available for production of items formerly manufactured from hard rubber and other thermosetting plastic compounds. Credit for the discovery of this new plastic is shared by The Pacific Lumber Company, San Francisco, The Institute of Paper Chemistry, Appleton, Wisconsin, and the Sheller Manufacturing Corporation, Portland, Indiana. The new plastic has been called Shellerite.

For years, the mammoth size and great age of these Californian giants have been a challenge to man's scientific mind. Finally, it was decided to investigate the chemical structure of the redwoods and learn what effect it had on their resistance to decay and ability to withstand the ravages of time and the elements.

Probably the most important discovery so far is that redwood trees produce catechol tannin, a soluble element which in the process of nature is converted into insoluble phlobaphenes, said to be the important factors in the lasting durability of redwood and its resistance to decay. When redwood is reduced to chips and subjected to a short cycle of high pressure steam, the phlobaphenes within the cell structure are broken down. The resultant fibre or powder produced is used for preparing the thermoplastic substance.

The Brazilian Minister of Agriculture has approved a project for the installation of 20 distilleries for the manufacture of alcohol from manioc. The output of the distilleries is placed at 40 million litres, and the chief centres of production will be in the States of S. Paulo and Rio Grande do Sul.

Industrial Glass Piping

Substitute for Scarce Metal

GLASS piping is being used in America in increasing quantities for industrial purposes as it provides a substitute for small-size metal piping which is scarce. In a recent broadcast the chairman of the board of Corning Glass Works, Mr. A. Houghton, said that one war plant had installed 27 miles of glass piping to convey corrosive chemicals. He also referred to the use of glass in the milk industry, saying that glass refrigerators were now possible as a result of the production of the new cellular glass (*see* THE CHEMICAL AGE, May 29, 1943, p. 584) with valuable insulating properties, while glass piping can be used for the hygienic transport of milk from one part of the dairy to another. Heavy-gauge Pyrex glass tubing, ideal for industrial use since it is resistant to corrosion, is being marketed in the United States in several sizes—$\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ in.—and equipped with standard flanges of cast iron. This piping, it is claimed, is capable of withstanding working pressures of 400 lb. per sq. in. when it is in lengths up to one foot, while it will take 140 lb. pressure when in 6 ft. lengths.

Institute of Fuel

Students' Medal

TO encourage the preparation of papers by students of Fuel Technology, the Council of the Institute of Fuel has decided to make an annual award of a medal, together with a prize of books or instruments to the value of £5, to be awarded annually for a paper submitted by a student member of the Institute or by a student under 25 years of age of any university or technical college in the United Kingdom.

The paper shall deal with some subject relating to the preparation or utilisation of fuel, or allied subjects. While the student is left free to choose his own subject if he so desires, the following subjects are suggested as a guide to his choice: (a) Discuss the industrial use of any two of the following gases: town gas, coke-oven gas, producer gas, blast-furnace gas, water gas, natural gas; (b) the trend of development in high or low temperature carbonisation of coal; (c) our present knowledge about the specific heat and heat conductivity of coal and coke; (d) the principles of screening; (e) the factors influencing the efficient blending of solid fuels; (f) the fundamental principles influencing the segregation of coal in bunkers when filling or discharging; (g) the possible developments in the use of petroleum gases.

Papers must be submitted to the secretary of the Institute under a "nom de plume," the name and address of the author being enclosed in a sealed envelope and sent with the paper. Papers must be received by the secretary on or before September 1 in any year. The name of the successful competitor in each year will be announced at the October meeting of the Institute, and the award presented at the annual dinner or luncheon, at which the prize-winner will be the guest of the Institute.

Papers must be limited to a maximum of 6000 words, and may be illustrated by line drawings or photographs. The Institute reserves the right to withhold the grant of a medal in any year if, in the opinion of the Papers Committee, no applicant deserves the award. In judging the papers submitted, consideration will be given to: subject matter; evidence of analytical power and logic; construction of paper in so far as it shows continuity of argument with an orderly development of the them; and English.

Fluorine and Dental Caries

Recent American Research

AS a result of an interesting chain of investigations a trace of fluorine is now believed to play an important rôle in decreasing susceptibility to dental caries, one of the most urgent public health problems of modern civilisation. About forty years ago a peculiar tooth condition known as mottled enamel was known to exist in certain areas of the Western United States. Investigations of the cause of this condition finally led to the conclusion that it was a condition confined only to certain areas and that the causative effects were exerted only during the period of enamel calcification. It was next found that the causative agent was carried by the drinking water but all attemps to isolate the substance failed. Not until spectrographic analysis was applied was this riddle solved. By this means it was shown that fluorine in amounts ranging from 2 to 14 p.p.m. was the causative factor involved. During this long period of study evidence had slowly accumulated that mottled enamel and a low incidence of dental caries were related. This was an even more important observation than the solution of the cause of mottled enamel. In the last two years some interesing work has been carried out which indicates with some degree of certainty that traces of fluorine, insufficient to produce mottled enamel, do produce resistance to caries if administered during the period of tooth development and calcification. The amount of fluorine that seems to be indicated is somewhat under 1 p.p.m., an amount which is known not to produce mottled enamel. It may well be that the inclusion of traces of fluorides in drinking water may help rule out the heavy toll on health now exacted by dental caries and it merits the attention of those responsible for long-range public health planning.

Technical Education Plans

Oil and Colour Chemists' Discussion

A MEETING of the London Section of the Oil and Colour Chemists' Association held recently at the Charing Cross Hotel, London, discussed the future of technical education in the light of the report recently published by the Technical Education Committee. Mr. N. A. Bennett, chairman of the London Section, presided. The aims of the committee, as set out in the report, arranged themselves into three main groups:

(1) To help the industry to attain a higher technical standard. It is the intention to approach industry for co-operation and to help to raise the status and professional spirit of chemists in the industry.

(2) To assist the boy who is pitchforked into the industry without guidance or encouragement, this scheme being essentially for the large indeterminate group of individuals who may be described as "technicians," who lack the fundamental chemical training, but who, nevertheless, may hold very important key positions in the industry by virtue of their experience and practice.

(3) To assist young chemists, graduates or undergraduates, to continue their studies along sound lines, which will enable them to develop their own talents, to render themselves more useful in the industry and therefore in their jobs.

Dr. H. W. Keenan said each section had appointed a co-ordinating officer to act as a personal link between individual members of the Association and the Technical Education Committee. Individual members should contact the co-ordinating officers on any matter concerning technical education.

Only a Preliminary

Mr. W. Garvie, the committee's vice-chairman, emphasised that the report must be regarded as preliminary. The committee's next job was to formulate a definite scheme based on the general principles laid down in the report. For a start, the committee was concentrating on the development of an apprenticeship scheme; their ultimate aims, as indicated in the report, went much farther than that. The Paint Federation, the Colour Makers' Association, and other bodies had agreed to appoint representatives to the committee.

Mr. P. J. Gay urged that by far the greater effort should be directed to helping the boys who entered the industry between the ages of 16 and 18 years, who had probably attended secondary schools and had the advantage of some interest at home in their further education. He distinguished them from boys of from 14 to 16 years who might be pitchforked into the industry without any clear idea of what they wanted to do and might not have much encouragement at home; and those who were older, whose studies were well advanced and who might even have graduated.

Need for a New Incentive

Mr. Norman Neville, director of the B.C.P.M.A., stressed the importance of the problem and said that without properly trained personnel we should never be able to realise the objective of full employment, on which prosperity depended. In America, where industry was on a very much bigger scale than in this country, the owners of a plant consciously developed the team spirit among employees, and appointed group leaders to teach the young entrants. It was also found advantageous in some cases to instruct them by means of models relating to particular mass-production operations which the entrants were intended to operate. The younger people must be given some incentive beyond personal gain; he believed there was a greater feeling of service to the community arising in us to-day than before the war. Mr. Neville did not agree with Mr. Gay that efforts in connection with specialist education for industry should be directed particularly to entrants from the secondary schools. It was extremely important to deal with the mass of the people. The difficulty seemed to be that there was no vision before the people, and he believed that that vision must be provided by propaganda.

Mrs. Neil R. Fisk welcomed the inclusion of girls as well as boys in the training scheme. In industry generally there was an unfortunate tendency for young women, and no doubt their employers also, to regard their work in industry as a mere stop-gap between school and marriage, which resulted in a wastage of potential skill. There seemed nothing more destructive of personality than to spend eight or nine hours a day on work which did not demand the best that one could give, and training would develop responsibility in girls as well as boys. Mrs. Fisk hoped that there would be facilities for a considerable proportion of the educational facilities to be provided during the day. The phrase "at least three evenings per week" occurred in the committee's report; but she urged that, for the average student working eight or nine hours a day, attendance at evening classes three times a week, plus homework, should be the maximum and not the minimum.

Mr. R. F. G. Holness said the committee had no doubt considered the fact that cer-

tain trade unions had training schemes under consideration, and he urged that unions covering the industry should be approached. He was worried by the tendency to make things a little too easy for those who benefited by educational and other schemes; from the point of view of formation of character, the young people should be expected to contribute towards their advancement by putting forward some effort themselves.

Vocational Guidance

Mr. E. R. Wells believed that after the war there might be some attempts at vocational guidance, perhaps with the aid of the Board of Education and the National Institute of Industrial Psychology. It was a good thing to assist trainees, many of whom did very well for themselves; but the young chemists, graduates or undergraduates, should be considered with the trainees as part of the whole personnel of a factory. Urging that educational facilities should be available to trainees locally in order to eliminate unnecessary travelling, Mr. Wells said there should be much more liaison between local technical schools. To interest school children in the local industries, works visits and other schemes might be arranged so that they might develop their own ideas as to the industries they would like to enter ultimately. Attempts should also be made to overcome anomalies, such as that students living just outside a county area had to pay almost exorbitant fees when attending classes in the county area. The matter should be dealt with by the Board of Education.

Mr. J. L. Hawkey emphasised the difficulty of lack of culture in this country. He had been fortunate in having mixed mostly with chemists who were cultured, but a few he had met had not been so fortunate, having ignored, in the course of their education, non-scientific subjects. People outside science did not appreciate all that the scientists were trying to do because the latter did not always express themselves humanly enough. The shortcomings of the education the boys received before entering industry could not be ignored in considering technical education.

Mr. J. S. Read said that employers, personnel officers, chief chemists, and so forth, should be approached for their co-operation.

Mr. L. O. Kekwick submitted that the technical education of chemists and of trainees were two different problems. The first essential for the chemist was that he should have a proper full-time education at a university; and he hoped that such courses would include subjects such as citizenship, simple economics, and industrial history, for no man could call himself educated unless he had a knowledge of them. Fluidity was a necessity in arranging a scheme of training, so that if a boy discovered that he did not like the paint industry, but preferred rubber manufacture or some other activity, it would be easy for him to make the change.

Mr. G. Copping, the committee's secretary, commenting on Mrs. Fisk's reference to attendance at classes "at least on three evenings per week," said the committee was referring to existing conditions, and not the conditions it wished to see. The Chairman asked the committee to do everything possible to give young people, before they left school, some knowledge of industry, which would prevent their being pitchforked into industries for which they were unsuited. Mr. Neil R. Fisk pleaded that everything possible should be done to abolish blind-alley occupations. If boys had to be engaged on such tasks as cleaning printing rollers, sweeping yards, and so on, then it should be clearly understood that they should spend only a little time on such tasks, and the greater part of the day on more interesting tasks which made them feel that they had a future. Dr. Keenan assured the meeting that co-operation in working out the educational scheme had been sought in various directions, and a member of a trade union had been invited to join the committee. The higher educational bodies had also been asked to help. Mr. Garvie added that members of the committee had had interviews with educational authorities, and they were all doing their best to work in close contact with those authorities.

Ethyl Cellulose

Plastic Low-Temperature Insulator

A NEW plastic made from cotton is playing a vital part in producing American bombers and fighting planes, Robert J. Metzler, technical engineer of Hercules Powder Co., told the Society of Plastics Engineers in Detroit recently. He said that ethyl cellulose, made from cotton and alcohol, can withstand the lowest freezing temperatures of any known plastic, or it can be formulated to bear up under temperatures as high as 80°C. In the very low temperature of the stratosphere, ethyl cellulose plastic is used to insulate the wires of aircraft engines, because the cotton plastic wiring will not snap under the frigid conditions. Ethyl cellulose is also used to make aluminium parts for aeroplanes. A hot-melt solution poured into moulds makes the forms on which the various aluminium parts are stamped.

Metzler revealed that Hercules, America's largest producer of purified cotton linters from which cellulose plastics are made, has expanded its ethyl cellulose output for war needs. The new, soft ethyl cellulose plastics, used to resist freezing cold, were developed last year as a replacement for certain uses of rubber.

Chinese Chemists in England

Guests of the British Council

TEN Chinese graduates, including four chemists, recently arrived in this country under a scheme operated by the British Council. With the aid of scholarships provided by the Council they will be gaining an insight into British methods of chemical production through their study at universities or colleges suited to their special qualifications, and by spending a period in British factories. Recently, a member of THE CHEMICAL AGE staff met two of these Chinese chemists and had the opportunity of discussing with them the position of the chemical industry in China. They were Mr. Loo Ti-Hi and Mr. Tsao Pung-Hyi. The former is interested particularly in the synthetic production of organic drugs, a subject which he hopes to study at Oxford under Sir Robert Robinson; the other is a chemical engineer, and he will be attached to Sir Alfred Egerton's department of chemical technology at Imperial College of Science and Technology. Both men were trained in the National Tsing Hua University. This university suffered its first removal in November, 1937, when the Japanese advance necessitated evacuation to Changsha. In the February of the following year a further move to Kunming was made. On both occasions the students had to make the long journeys on foot, no transport being available. At Kunming the universities of Pekin, Nankai and Tsing Hua were amalgamated to form what are now known as the National Associated South-Western Universities. The way the training of China's scientists and technicians has been interrupted is but a small indication of how the invasion has threatened to disrupt the whole fabric of Chinese life, only the resilience of its fabric preventing utter disintegration.

War-Time University

An interesting description of the conditions under which work is proceeding at the Associated South-Western Universities has been given by Dr. Joseph Needham, leader of the British Council's scientific mission to China, in the current issue of *Nature*. All the departments are housed in hutments made of mud brick, and roofed very simply with tiles or tin sheets. The floors are beaten earth, and extreme ingenuity has been necessary to overcome war-time shortages and fit up the laboratories for research and teaching. Built into the floors of each mud-brick building are large petrol drums, into which, when an air-raid siren sounds, all the most valuable apparatus is lowered in order to preserve it against anything but a direct hit. Dr. Needham mentions that the professor of chemical engineering, Dr. Hsien Ming-Shan, is a pupil of Sir Alfred Egerton. The University's physical chemists include Mr. Chien Jen-Tuen, a pupil of Professor C. N. Hinshelwood.

Dispersal of Industry

China's chemical industry, to-day, is controlled by the Department of Ordnance, a government agency comparable with our Ministry of Supply, although it is subordinate to the Ministry of War. Against air raids industrial plants have to rely on dispersal rather than fighter protection, and therefore many small industrial units making such products as sulphuric acid are now to be found dotted about all over Free China. The chemical industry is only at an early stage, and when one adds to this fact the necessity of avoiding industrial concentration it is easily understood why "large scale production" in China is on a very small scale compared with Western practice. At Chungking there is a synthetic ammonia plant, and in this branch of the industry the Chinese have been glad to accept the advice of Allied chemical experts sent to help them. Explosives are being made in small scattered arsenals, but production is quite inadequate for China's army and the balance has to be made up by imports of ready-made explosives. The efforts of Chinese chemists to produce fuel for internal combustion engines by cracking tung oil have already been mentioned in THE CHEMICAL AGE. Another branch of fuel technology is the production of power alcohol, and the total output of the thousands of small alcohol plants now represents a substantial contribution to China's war effort.

Many of these industrial processes have had to be embarked upon since the Sino-Japanese war began, and as there was no reserve of industrial technologists available, it is not unusual for the chemists and universities and other academic institutions to develop a process in their research laboratories, and then to see it through the pilot-plant stage to final production on a commercial scale. The fact that many Chinese scientists have to concern themselves with both original research and practical application and development is likely to have far-reaching effects on science as taught in the universities and on technology as practised in the factories. The absence of any hard artificial division of science into the *pure* and *applied* categories is interesting, and worth the attention of certain scientists in the Western hemisphere who, from the heights of their ivory towers, frown down upon applied science, declaring that it is not science at all.

A CHEMIST'S BOOKSHELF

SPOT-TESTS FOR THE IDENTIFICATION OF CERTAIN METALLIC COATINGS AND OF CERTAIN METALS IN BULK. By B. S. Evans and D. G. Higgs. Cambridge: Heffer & Sons. Pp. 24. 3s. 6d.

Several schemes have been published for complete qualitative analysis by means of drop tests; the scope of the tests dealt with in this treatise is far less ambitious and more restricted. The technique is simpler, but the problem to be solved, while far less complex, has its own peculiar difficulties which have no counterpart in the ordinary drop test. The attempt made here by spot-tests is to identify the metal (or alloy) which has been used as a coating on another metal and in addition to this to employ a rough sorting test for ingots, billets or bars of metal. Twenty tables contain the composition of the reagent, its application and the reactions which allow rapid identification of metal or alloy coatings in commercial use. The authors do not claim too much for these spot-tests, which are not meant to substitute or rival either ordinary qualitative analysis or any of the various established methods of drop analysis; they admit that the results of these tests afford in some instances no more than a strong probability, and not a proof, of the presence (or still more the absence) of given metals. The tests are, however, simple to apply and generally rapid; they require a minimum of apparatus, labour, and skill, and should therefore find a sphere of usefulness. Many references record the development of such tests as far back as 1929.

STARCH AND ITS DERIVATIVES. By J. A. Radley, M.Sc., F.I.C. (Second ed., revised.) London: Chapman and Hall. Pp. 558. 36s.

The new edition of this standard work on starch and its technology contains eleven entirely new or re-written chapters, the size of the volume having been increased by over 200 pages. The addition of about 1200 new references makes it as comprehensive and up to date with regard to the industrial preparation and treatment of starch as is possible in war time, when so much of the latest research must needs remain unpublished, and such work as has been published in Germany and the occupied countries is still largely inaccessible. Excellent chapters on the chemical constitution of starch (contributed by Professor E. L. Hirst and Dr. G. T. Young), its physical properties, the phenomena of swelling and gelatinisation, and "starch iodide" formation are followed by an exhaustive account of the way starch is manufactured from roots and cereals, its modification by oxidation, the preparation of glucose, maltose, ethyl alcohol, acetone, and dextrin (there is one chapter on the making of dextrin, and another on adhesives derived from dextrin). Its uses in the textile and paper industry are next considered, while room has been found to discuss the rôle of starch in bakery. A number of miscellaneous uses, as for instance in laundry work and in making explosives, are briefly described. The last third of the book deals with analytical considerations (including the analysis of dextrin) and the preparation and action of the different types of amylase. The monograph contains abundant illustrations among which the photomicrographs are outstanding.

INTERMEDIATE QUALITATIVE ANALYSIS. By A. J. E. Welch, Ph.D. London: University Tutorial Press. Pp. 154. 3s. 9d.

This book is intended to meet the requirements of students entering for an Intermediate Examination or the Higher School Certificate, and is generally useful in post-Matriculation classes. It replaces Briggs and Stewart's *Qualitative Analysis*, on which it is based. The point has been appreciated that a sound understanding of the theories underlying the practice of analysis is essential, and a chapter dealing briefly with the more important principles of this theory is included. The tables and instructions for laboratory work are detailed without being over-complicated.

MINERAL ANALYSIS BY U.V.

Every day new applications for the ultra-violet lamp are being found by the mining industry generally and particularly ore testing laboratories. The ultra-violet light proves itself an invaluable tool for laboratory, mill control, and prospecting.

Mr. Thom, head of the Denver Ore Testing Laboratory, in searching for a satisfactory and rapid method for evaluating samples of talc products, recently found that the ultra-violet lamp could be used to advantage in quickly determining the various associated minerals and an indication of their proportion in the concentrate.

An ore, which was a mixture of talc ($H_2Mg_3(SiO_3)_4$), tremolite ($CaMg_3(SiO_3)_4$), and quartz (SiO_2), was placed under an ultra-violet light and the three minerals were easily distinguished because of the differences in colour. The talc appeared practically snow-white in contrast to a pink for the tremolite and a blue for the quartz. By making up standards of known chemical and physical analyses, the grade of the various products was easily evaluated by visual comparison in a few minutes, as against the usual three or four days.

Society of Chemical Industry

Points from the Annual Report

THIS year's annual meeting of the Society of Chemical Industry takes place as we go to press, and will be fully reported in our next issue. The annual report, to be formally presented to members at the meeting, has already been issued, and contains many points of interest. Dr. William Cullen, as president, has continued his series of visits to home Sections and Groups, despite prevailing difficulties, and as a result the membership maintains an upward trend. The total figure on January 1, 1942, was 4672; this has been altered by 536 accessions and 287 deductions, leaving the membership on January 1 this year at the figure of 4921.

Changes in the Council

There are the usual changes to report in the composition of the Council. Most important of these is the resignation of Dr. Cullen from the presidency, which he has held for two years. He is succeeded by Mr. Wallace P. Cohoe, who is a vice-president and was chairman of the American Section in 1938-40. He will, of course, retire from his vice-presidency; the other vice-presidents retiring are Dr. R. T. Colgate, Mr. B. G. McLellan, and Professor H. L. Riley. Nominated to fill these vacancies are Messrs. G. Dring, C. S. Garland, V. G. Bartram (Canada), and Professor J. C. Earl (Australia). Ordinary members of Council retiring are: G. Dring, C. S. Garland, H. V. Potter, and A. J. V. Underwood; G. M. Dyson has resigned, and F. S. Sinnatt died during the current year. Nine nominations have been received for these vacancies, and the result of the necessary ballot will be announced at the meeting. Candidates are: H. W. Cremer, L. A. Jordan, G. King, R. Lessing, W. C. Peck, H. V. Potter, J. A. Reavell, A. Speedy, and H. Talbot. The retiring president has been appointed chairman of the Council for the coming year. Members are being asked to elect Dr. R. T. Colgate and Dr. H. J. T. Ellingham to the position of joint honorary secreraries, the Council having decided to increase the number of honorary officers by the creation of these two posts. The following changes take place among the officers of the Sections after the meeting:

	Retiring Chairman	*New Chairman*
Glasgow:	W. H. Nuttall	James Bruce
London:	Dr. Underwood	Dr. R. T. Colgate
Manchester:	S. A. Brazier	F. Scholefield
Nottingham:	A. D. Powell	Dr. H. H. Barber
Ottawa:	H. P. Stockwell	Clayton E. Watson
South Wales:	John Christie	Neil Lawson
	Retiring Secretary	*New Secretary*
Birmingham:	R. S. Potter	J. W. Crump

As already announced, the Society's Medal has been awarded to Dr. L. H. Lampitt. Other awards are: S.C.I. Medal (Canada) to Mr. R. A. Witherspoon (Montreal Section); S.C.I. Prize (Ottawa) to Mr. L. S. Williams; S.C.I. Prizes (Liverpool) to Mr. A. W. Taylor (senior), and Mr. F. Lloyd (junior), and Mr. R. Jones (special merit); Saville Shaw Medal (Newcastle-upon-Tyne) to Dr. D. S. Laidler. The John Gray Scholarship will not be awarded this year, and a Hurter Memorial Lecturer is not being appointed.

Endowed Memorial Lectures

A new feature in the Society's activities is the establishment of lectures endowed to perpetuate the memory of scientists and industrialists who have aided the building up of our chemical industry. The general idea is that the new lectures shall be delivered once every three or four years, so that in London there may be one such lecture yearly, and in the provinces two annually. The following Memorial Lectures have been arranged, with endowment funds either in being, or in course of establishment: "*Henry E. Armstrong*," to be delivered in London (the first lecture will be given by Sir Harold Hartley on May 17, 1944); "*Baekeland*," to be given under the auspices of the Plastics Group in London and elsewhere; "*Brotherton*," to be given before the Yorkshire Section (Dr. Cullen will be the first lecturer); "*Chance*," to be delivered before the Birmingham Section; "*Robert Horne*," to be given alternately at Bristol and Swansea; "*Leverhulme*," to be delivered before the Liverpool Section (the first lecture was given on June 29 by Horatio Ballantyne); "*Charles Tennant*," to be delivered before the Glasgow Section (the first lecturer will be Sir William Alexander, M.P.).

STEEL-CUTTING BY GAS

It is claimed that a shipload of carbide is being saved each month by a new ferrogas method of harnessing and "boosting" household gas so that it may be used for steel-cutting, billet-dressing, de-scaling, brazing, welding and other operations previously performed by acetylene gas. The new method, it is stated, has been installed by Oxy-Ferrolene, of Oadby, Leicester, in many factories. It is a war-time development of the Ferrolene process, invented by a Welshman in the United States 40 years ago.

Personal Notes

MR. JAMES JAMIESON, of Edinburgh, has been elected president of the Institution of Gas Engineers for 1943-44.

SIR EDWARD APPLETON, secretary of the D.S.I.R., received the honorary degree of Doctor of Laws of Birmingham University last week.

MR. CARL ELBRIDGE NEWTON, president of the Chesapeake and Ohio Railroad, has been appointed Director of Mine Operations for the U.S. Government.

MR. MALCOLM DUNBAR, managing director of L. Oertling, Ltd., is the new President of the London Rotary Club. He succeeds Sir Claude James, Agent General for Tasmania.

MR. ARTHUR MARSDEN, who has been honorary secretary of the Bristol Section of the Society of Chemical Industry for 22 years, has been presented with an illuminated address in appreciation of his services to the Society.

New Ph.D.'s in chemistry at Leeds University include the following:—S. LEWIN, G. S. PARK, E. L. JOHNSON, S. D. SOURLANGAS, MARY SANDFORD. New M.Sc.'s are J. DAWSON (biochemistry) and H. HOLNESS (chemistry).

MR. GEORGE HOYDON, technical assistant and chemist at Uddingston gasworks, has submitted his resignation to Lanarkshire County Council, as he has received another appointment. MR. WILLIAM RUSSELL, of Coatbridge, has been appointed to the vacant post.

When PROFESSOR W. E. S. TURNER, of the Department of Glass Technology, Sheffield University, was married at Edinburgh last week, his bride, MISS H. N. MONRO, wore a wedding dress of pale blue glass silk, and her hat, shoes and handbag were woven from the same material. The fabric was made by Glass Fibres, Ltd., Glasgow.

DR. FLORENCE SIEBERT, associate professor of biochemistry at the Henry Phipps Institute, University of Pennsylvania, has received the first $2500 award of the American Association of University Women. Last year she received the Garvan Medal of the American Chemical Society for her work on the chemistry of tuberculosis.

MR. L. M. PIDGEON, of the Canadian National Research Council staff, has been awarded the platinum medal of the International Nickel Company for his successful development of a method of producing magnesium, whereby the metal is distilled in an electric furnace from dolomite briquetted with ferrosilicon. The process is being used in six plants in N. America which together cost $40,000,000.

After 34 years with the West of Scotland Agricultural College, MR. PETER CALDWELL, analytical chemist, has retired. The college governors have expressed their high appreciation of his work.

DR. E. F. ARMSTRONG, for several years past a joint honorary treasurer of the Royal Society of Arts, was elected president at the annual meeting on June 30, in succession to Sir Edward Crowe. MR. WILLIAM WILL was appointed to succeed him, with MR. OSWALD MILNE as joint honorary treasurer.

An assistant chemical manager, a charge chemist, and a charge hand who, after an explosion in a factory making nitroglycerine, took steps which prevented a second explosion, have all been awarded the bronze medallion of the Carnegie Hero Trust and an honorarium of £20. They are DR. WILSON CHARLES GEOFFREY BALDWIN, MR. FRANK HENRY WHEELER and MR. WILLIAM SALLOWS. Earlier this year they received the Edward Medal, and the citation which accompanied the announcement in the *London Gazette* of this award was quoted in our issue of April 24.

Obituary

MR. WILLIAM LEE POWERS, general manager of the American Cyanamid and Chemical Co., died on April 18, aged 52.

DR. GEORGE MCPHAIL SMITH, professor of inorganic chemistry at the University of Washington, died in April at the age of 64.

DR. PERCY TALBOT WALDEN, who died last April at the age of 73, was emeritus professor of chemistry at Yale University.

MR. PAUL INGENLATH, chairman and director of Paul Ingenlath, Ltd., makers of gelatins and glues, died on June 27, aged 70.

SIR EDGAR BOWRING, chairman of C. T. Bowring and Co., Ltd., oil manufacturers, has died, aged 84.

MR. JAMES RODGER MCCULLOCH, well known as a member of McCulloch Brothers & Wilson, laboratory funishers, Glasgow, died suddenly in Glasgow on June 29.

DR. ELLWOOD BARKER SPEAR, at one time associate professor of chemistry at the Massachusetts Institute of Technology, and later research director of the Goodyear Rubber Co., died on May 1, aged 68.

MR. HERBERT BAIRSTOW, director of Midland Tar Distillers, Ltd., has died at Prestatyn, Flintshire, aged 60. His father was at one time manager of J. Turner & Co., Queen's Ferry, in which business his son joined him, and some years ago, when the company was amalgamated with the Midland Tar Distillers, Ltd., Mr. Bairstow became a director.

Parliamentary Topics

Concentration of Production

IN the House of Commons last week, Mr. Rhys Davies asked the Minister without Portfolio whether, when considering the post-war unemployment problem, he would consult with the Departments of State concerned to ensure that in concentrating industries and denuding staffs in areas depressed between the two wars, special regard was had to the prospects of the firms involved when hostilities cease.

Sir W. Jowitt: Yes, Sir. The Departments concerned are keeping well in mind the Government's pledge in the White Paper on Concentration of Production (Cmd. 6258) to take all measures open to them to assist the speedy reopening of closed premises.

Mr. Davies: Will my right hon. and learned Friend bear in mind that between the two wars some small industries were induced to come to the depressed areas, to combat unemployment, and that if Government Departments, especially the Ministry of Labour, get their way by denuding them of staffs they will close these industries down so that they will never open again, and we shall be back after the war to a state of depression once more?

Sir W. Jowitt: The immediate need is to provide man-power for the Services. This question deals with the position after the war.

Industrial Gloves

Mr. Ness Edwards asked the Chancellor of the Exchequer whether he was aware that miners and other industrial workers have to pay Purchase Tax on industrial gloves, whereas decorative utility gloves are sold free of tax in the open market; and whether he would take steps to end this anomaly.

Sir K. Wood, in a written answer, said he could not see his way on revenue grounds to exempt from tax all gloves used or capable of being used for protective purposes in industry. In addition it would be impossible to frame a definition which would cover gloves used in industry but not include many kinds of gloves suitable for non-industrial use.

Laboratory Overalls

Mr. Edmund Harvey asked the President of the Board of Trade why coupons for laboratory overalls were available for laboratory assistants in universities and technical colleges but not for the professors, lecturers and demonstrators who have to work in these laboratories; and whether he would make provision for coupons to be supplied in such cases.

Mr. Dalton: In view of the stringency of clothing supplies, I have had to limit the general occupational supplement to persons, whose work is mainly manual and imposes heavy wear and tear on their clothing. For this reason, I have given the supplement to laboratory assistants and not to teaching staff, who generally spend many of their working hours in the lecture room. I shall be glad to consider arrangements for the next rationing period which begins on September 1.

Technical Colleges

Mr. Leach asked the President of the Board of Education whether his attention had been called to the unsuitability of the regulations now governing technical colleges, which tended to prevent much-needed expansion in the higher branches and in research; and whether he would re-examine the position, with a view to the development of all branches of technical education.

Mr. Butler replied in the negative. The regulations relating to further education, he said, were of a general character and in no way restricted the development of technical colleges according to their individual needs. He was aware that there was room for a considerable expansion of technical education in this country and he was giving careful consideration to this matter.

Lord Leverhulme

The First Memorial Lecture

THE first Leverhulme Memorial lecture was given at last week's meeting of the Liverpool section of the Society of Chemical Industry in the Arts Theatre of Liverpool University. Mr. A. E. Findley, the section's chairman, presided. The lecturer, Mr. Horatio Ballantyne, said it was fitting that the section should be associated with these memorial lectures in view of the late Lord Leverhulme's long connection with Liverpool, the pre-eminence of the area in the chemical industries of England, and the fact that Liverpool University was the *alma mater* of many of his scientific and technical staff.

Mr. Ballantyne gave an account of the rise of Lever Brothers and the expansion of the company's interests at home and abroad. By far the greatest of Lord Leverhulme's benefactions was the fact that by his business genius he provided for countless thousands of men and women, in all grades, openings into honourable careers, work in pleasant surroundings and "social security" devoid of all taint and charity or dole. Lever was fortunate in having from the outset expert technical assistance of his own choosing. He appreciated the value of the chemist, but whatever his private hopes were in 1884-85 he could not have realised the vastness of the field he was about to enter—nothing less than the exploitation in every conceivable way of the whole range of natural glycerides.

General News

The Treasury has made an Order entitled the Safeguarding of Industries (Exemption) No. 1 Order, 1943 (S.R. & O. 1943, No. 854), renewing until June 30, 1944, the exemption from Key Industry Duty of all articles at present exempt.

The Cosmetic and Toilet Preparations Association of Great Britain was registered on June 29, as a company limited by guarantee, without share capital. The original number of members is 100, and the annual subscription 10 guineas.

Experiments are taking place in the use of surplus old potatoes in making beer. The Ministry of Food's scientific advisers are consulting Professor R. H. Hopkins, of Birmingham, and scientific experts employed by leading brewers, to discover whether and to what extent potatoes can be thus used.

The efficacy of phenothiazine as a vermicide for sheep was described by Dr. D. G. Davey, of I.C.I. (Pharmaceutical), Ltd., at a recent Glasgow conference. He gave instances of flocks that received the drug gaining an average of 5 lb. per head, compared with untreated sheep.

Branches of the chemical industry in which the risk of pneumoconiosis may be incurred should direct their attention to three new Orders (S.R. & O. 1943, Nos. 885, 886, 888) dealing with workmen's compensation under the pneumoconiosis benefit scheme, which came into force on July 1.

The Toilet Preparations (No. 2) Order (S.R. & O. 1943, No. 863), extends the operation of the current Toilet Preparations Order for a further two months. The current restriction period beginning on January 1, 1943, will therefore cover eight months instead of six, and end on August 31.

The Trading with the Enemy (Specified Persons) (Amendment) (No. 9) Order, 1943 (S. R. & O. 1943, No. 862), which came into force on June 28, contains 300 additions to the "Black List" of traders abroad with whom it is unlawful to have dealings of any kind. Names of chemical and metallurgical interest include: Soc. de Resp. Química Grafica, Ltda., Corrientes 424, Buenos Aires, and La Primera Junta 328, Quilmes, Argentina; Industria Brasileira de Fios e Artefactos de Metais, Av. Amazonas 336, and Rua Pouso Alegre 39, Bello Horizonte, Brazil; Laminação de Metais "Elgo," Ltda., Rua Xavier de Toledo 14, S. Paulo, Brazil; and Aparatos de Laboratorios, Ltda., Catedral 1476, Santiago, Chile. Among the 160 deletions from the list is: Fabrica de Acidos y Productos Químicos "La Viga" (Felix Berck y Cia.), Calzada de la Viga 54-58, Mexico City.

From Week to Week

New members elected last month to the Manchester Chamber of Commerce include Owen W. Marks, manufacturing chemists, Mersey Bank Laboratories, East Didsbury, Manchester, 20.

During June employees of 633 firms and organisations joined the Red Cross Penny-a-Week Fund. This represents an addition to the Fund of nearly 100,000 contributors. Workers in 43,500 undertakings are now contributing each week.

To encourage farmers to order next spring's requirements of sulphate of ammonia now, the Government is granting a special allowance of 15s. a ton on orders of over two cwt. booked during July. The application of this and other nitrogenous fertilisers during autumn, except for market gardens, has been prohibited.

A summer school in industrial X-ray crystallography has been arranged by the Departments of Physics, and Mineralogy and Petrology, of Cambridge University, for the fortnight, September 6-18. There will be two lectures a day, each followed by two hours of practical work. Persons wishing to attend should obtain an application form from G. F. Hickson, M.A., Stuart House, Cambridge, and return it by July 26.

Foreign News

Citric acid is being produced in S. Paulo province, Brazil, by the fermentation process.

A new aluminium plant is being established at Ajka, Budapest, states the German radio.

An export tax of 5 per cent. *ad valorem* has been re-imposed on asbestos mined in the French zone of Morocco.

Tung oil crop this year in the U.S. is expected to exceed 6,000,000 lb., compared with 2,300,000 lb. last year.

Montecatini has received permission to erect a plant for the manufacture of chemical fertilisers in Croatia.

Concessions for the erection of new sulphuric-acid plants in Bulgaria have been granted to German and Italian firms.

The capacity of the mercury-producing plant in New Columbia, Canada, has been increased twenty times since it was started three years ago.

A shark-liver-oil plant at Santos, Brazil, produced in its first forty days of operation over 1000 kilograms of oil, averaging 12,000 I.U. of vitamin A per gramme.

All copper and copper alloys from vats, boilers and pipes in German breweries have been requisitioned, state Press reports from Berlin reaching Stockholm.

A summer school in explosives chemistry is being held this month at the Ohio State University, under the war training programme of the U.S. Office of Education.

Laboratory ware, including thistle funnels, retorts, pipettes, burettes, and condensers, are being made by an electro-plating and enamelling plant in Johannesburg, South Africa.

Iodine is being extracted from the drilling water of Russian oil wells. Brines from the Baku region gave a crude iodine yield of 66 per cent., activated charcoal being used to adsorb the iodine ion.

Nickel production in Canada last year was 5,000,000 lb. above the 1940 rate. This expanded production, coupled with salvage of nickel-bearing scrap and more economical use of the metal, has eased the threatened shortage, reports the International Nickel Co.

The appointment of a Committee to study the cultivation of the tung tree is announced by the Argentine Ministry of Agriculture, it being claimed that the climate and soil of the territory of Misiones are especially suited to that purpose.

A mica substitute, called Polectron, has been developed by General Aniline and Film Corp., New York. It will stand the heat generated by high-frequency electric current, while it resembles mica in its electrical insulating property.

Full-scale production of potassium chlorate has started in the new $300,000 plant of International Minerals and Chemical Corporation at Columbia Park, Ohio. The necessary muriate of potash is shipped there from Carlsbad, New Mexico.

Dow Chemical Co. has acquired an entire natural gas field in Osceola County, Mich., with a potential capacity of 30,000,000 feet per day. The company will pipe the gas a distance of 75 miles for use as fuel and for chemical extraction purposes.

El Salvador's silver output trebled, and gold production in the first quarter of 1943 also advanced over the corresponding period of 1942. Silver production increased from 30,200.8 troy ounces to 54,840.3, gold increasing from 7,611.9 oz. to 7,985.5

Serious shortage of copper sulphate is reported in Bulgaria. To solve the problem the State coal mines at Pernik plan to build a plant to make copper sulphate near the copper deposits at Elizerna and a sulphuric-acid plant at Elechnitza.

Chemicals in short supply in America include acrylonitrile, aluminium trihydrate, benzol and derivatives, butadiene, cresols, lithium chemicals, monoethanolamine, phenol and derivatives, tricresyl and triphenyl phosphates, styrene, sulphuric acid, and toluol and derivatives.

Nicaragua's gold production is affected by the shortage of iron, steel, and rubber. It is also reported that a number of mines may be obliged to discontinue operations if fuel oil and carbide are not obtained within the next month.

The Saint-Denis dyestuffs and chemicals concern reports that the company's plants worked irregularly, and large numbers of orders had to be rejected. The financial position was improved by large dyestuffs sales to Francolor.

A new fire-resistant paint, known as Guweelaskyndsfarg, was recently placed on the market by A.B. Gunnar Westholm, of Stockholm, Sweden. It is said to be so effective that ordinary paint or varnish may be applied over it, yet the surface still remains fire-resistant. It is being used for painting ammunition boxes and military buildings.

A new German company, Berliner Methan-Vertriebs G.m.b.H., has been formed with a capital of 200,000 RM. The company will act as distributor for methane and compressed coal produced by the benzol association, the central organisation of German benzol producers, and other producers of fuel gases.

Röhm and Haas Co., Philadelphia, have produced a substitute for rotenone insecticides with their Lethane 60. It is the third synthetic insecticide developed in their laboratories, the others being Lethane 384 and Lethane Special. The latter has been used in Britain to kill insects in air raid shelters.

A new disinfectant for seeds, containing tetramethyl thiuramdisulphide, is being made by Du Pont de Nemours for vegetable crops. The same chemical is contained in another new fungicide, called Thiosan, which Bayer-Semesan have put on the American market; when sprayed on turf this compound stops such grass-diseases as " brown patch " and " dollar spot."

Savings to the U.S. Government of more than $600,000,000 in construction costs alone have resulted from improved processes developed in recent years by Du Pont engineers and chemists, said Thomas H. Chilton, of Du Pont's, in accepting the 1943 Egleston Medal of the Engineering Schools of Columbia University. He instanced nitric acid production, in which improvements have saved over $250,000,000.

A modern wood-treating plant is to be built at Clarenville, Trinity Bay, Newfoundland. The enterprise is receiving support from the Government and from the Newfoundland Railway, and the bulk of the work, to begin with, will be in creosoting railway sleepers. It is estimated that the cost will be about $250,000, and it is expected that the demand for creosoted woods in Newfoundland will keep the plant in continuous operation.

A chrome ore deposit has been found in the Bird River district of Manitoba. The Canadian Press reports that it is extensive enough to support two plants to a daily capacity of 1000 tons of ore.

One thousand large users of chemical products in America have been asked by the War Production Board to report on their chemical products reclamation practices. This extension of the board's salvage scheme for chemicals covers manufacturers of munitions, aircraft, heavy machinery, engines, and plastics. Chemicals being reclaimed include carbon tetrachloride, naphtha, toluene, benzol and ethyl and butyl alcohol.

A German-born naturalised American citizen, Ferdinand Kertress, was sentenced in a Federal Court in New York last week to six years' imprisonment and fined $4000 for exporting to Germany (by the way of South America) quantities of rhodium, iridium, and palladium—metals much needed by the Germans. The chemical marketing company owned by the accused, but now operated by the Alien Property Custodian, was fined $10,000.

In order to meet the shortage of salt in S. Paulo, Brazil, the State Government has decided to import salt from Argentina, to obtain larger supplies from the salt pans at Cabo Frio (Rio de Janeiro), and to start producing salt by evaporation at Santos. In addition, the National Salt Institute has decided to remove the restriction whereby salt could be produced in the State of Rio de Janeiro only between September and April, and has ordered the State's salt producers to intensify their output to the maximum.

Forthcoming Events

A " Science for Victory " meeting, organised by the **Association of Scientific Workers,** will be held on **July 11,** at 7 p.m., in the Lecture Theatre, Birkbeck College, Breams Buildings, E.C.4. Sir Robert Watson-Watt will be in the chair, and the speakers include Professor J. D. Bernal, Mr. J. G. Crowther, Professor S. A. Sarkisov (Moscow Research Institute of the Brain), and Sir Alfred Webb-Johnson.

The celebration of the centenary of **Rothamsted Experimental Station** will be held on **July 21.** Visitors will be shown the laboratories, field experiments and the hundredth wheat crop on Broadbalk Field. The Minister of Agriculture, Mr. R. S. Hudson, will be present.

A meeting of the **Royal Institute of Chemistry** (Birmingham and Midlands section) will be held in the Latin Theatre, Birmingham University, on **July 21,** when Mr. S. B. Tallentyre will speak on " Essential Oils " at 6.30 p.m.

A meeting of the **Institute of Fuel** will be held in the James Watt Memorial Institute, Great Charles Street, Birmingham, at 2.30 p.m., on **July 21,** when a paper, " Radiant Heat for Industrial Processes ' Infra-red ' by Gas," will be presented by L. W. Andrew, B.Sc., and E. A. C. Chamberlain, Ph.D., of The Gas Light and Coke Co.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

NEWTON AND WRIGHT, LTD., London, W., manufacturers of scientific instruments. (M., 10/7/43.) June 18, debenture and further charge, to Friends Provident and Century Life Office securing £2000; charged on certain properties and policies, also general charge. £50,156. December 18, 1942.

Satisfaction

LONDON AND SCANDINAVIAN METALLURGICAL CO., LTD., London, S.W. (M.S., 10/7/43.) Satisfaction June 9 of debenture registered July 18, 1942.

Company Winding-up Voluntarily

BRITISH GENERATOR MANUFACTURING COMPANY, LTD. (C.W.U.V., 10/7/43.) By special resolution passed June 18. Victor Lawrence Bell, 27-28 Old Jewry, E.C.2, appointed Liquidator.

Declarations of Solvency

BRITISH GENERATOR MANUFACTURING CO., LTD., London, E.C., manufacturers of gas generators for acetylene welding. Declaration of Solvency filed June 17.

PURE METAL MANUFACTURING CO., LTD., Rainham, Essex. Declaration of Solvency filed June 18.

Receivership

METAL ABRASIVES, LTD., London, N. (R., 10/7/43.) D. W. Brown, 3 Lancaster Road, N.11, appointed receiver, June 8.

Company News

British Plaster Board, Ltd., have declared a final dividend of 15 per cent., making 25 per cent. for the year ended March 31 (same).

British Portland Cement Manufacturers, Ltd., report a net profit of £402,276 (£403,134) for 1942, and are repeating last year's 15 per cent. distribution.

Associated Portland Cement Manufacturers, Ltd., announce a net profit of £122,030 (£109,305). Ordinary dividend is 9 per cent. (same). Forward £219,530 (£217,648).

Titanine, Ltd., announce a profit, for the year ended March 31, of £25,351 (£24,954), and have declared a final dividend of 10 per cent., making 20 per cent. (same).

A record profit of £69,210 was earned by the **Cape Asbestos Co., Ltd.**, in 1942 (1941, £93,521). Dividends are the same at 17½ per cent. (preference) and 12½ per cent. (ordinary).

Profit of the **British Thermostat Co., Ltd.**, for the year ended January 31, is announced as £34,754 (£29,847), after depreciation, etc. Final dividend 11 per cent., making 18½ per cent. (same).

Crosfield's Oil and Cake Co., Ltd., announce a net profit, for the year ended March 31, of £13,261 (£10,617), and have again declared a dividend of 1s. 6d. per share, plus a bonus of 6d.

Barry and Staines Linoleum, Ltd., report a profit of £70,266 (£65,524) for the year to January 31 last. A first and final ordinary dividend of 6 per cent. is being paid, compared with a total of 7½ per cent. last year.

J. S. Williams, Ltd., paint and varnish manufacturers, etc., Maidenhead, have changed their name to **Berger Plastic Developments, Ltd.** The directors are: H. J. Dodds, K. H. Robson and C. C. Fry.

The Bleachers' Association, Ltd., have returned a net profit of £122,030 (£109,305) for the year to March 31 last. Six months' arrears of dividend on the 5½ per cent. cumulative preference stock are being paid, bringing the dividends up to September 30, 1935.

Lovering China Clays, Ltd., have made a trading profit, for the year to March 31, 1943, of £16,084 (£11,766). After allowing for taxes, debenture interest, etc., there remains a net profit of £112 (net loss £3852). Profit increase is entirely due to higher dividend received on holding in English Clays Lovering Pochin.

New Companies Registered

Spicer, Lawson, Ltd. (381,283).—Private company. Capital: £100 in 100 shares of £1 each. Manufacturing chemists, chemical engineers, sterilisers, dyers, cleaners, laboratory proprietors, etc. Directors: Reina D. Mageran; Bernhard Furstenberg. Registered office: 93-97 Regent Street, W.1.

A. H. Gadsby & Co., Ltd. (381,134).—Private company. Capital: £200 in 200 shares of £1 each. Mechanical, electrical, chemical and general engineers, etc. The directors are: A. H. Gadsby; L. R. Gadsby. Registered office: 7 Occupation Road, Walworth, S.E. 17.

Clarendon Chemicals, Ltd. (381,289).—Private company. Capital: £300 in 300 shares of £1 each. Manufacturing chemists, chemical engineers, sterilisers, dyers, cleaners, manufacturers of oils, bleaches, detergents, etc. Directors: F. G. Sturrup; J. A. Toledo. Registered office: 598 Chiswick High Road, W.4.

Clarkes (Ammonia Specialists), Ltd. (381,277).—Private company. Capital: £2,500 in 10,000 shares of 5s. each. To acquire the business of manufacturing chemist carried on by John Eckford at Feltham, Middlesex, as Clarkes Manufacturing Chemists. Directors: J. Eckford; S. H. Channon. Registered office: Spring Farm, High Street, Feltham, Middlesex.

Childs Chemical Industries, Ltd. (381,421).—Private company. Capital: £1000 in 1000 shares of £1 each. Manufacturers and importers of and dealers in fertilisers and feeding stuffs, manufacturing chemists, manufacturers of and dealers in agricultural requisites, etc. First director, Ernest Childs. Registered office: Old Town Hall Chambers, 41 Guildhall Lane, Leicester.

Para-Plastics, Ltd. (381,195).—Private company. Capital: £5000 in 5000 preference shares of £1 and 60,000 ordinary shares of 1s. each. Manufacturers of and dealers in plastics, rubber, resins and elastomers, makers of paints, lacquers, and corrosion and moisture-resisting materials, manufacturing and research chemists, etc. Subscribers: G. Frenkel; W. G. Bailey. Solicitors: Wm. Gilchrist Bennett, Grosvenor Gardens House, S.W.1.

Chemical and Allied Stocks and Shares

THERE has been some improvement of activity in the stock and share markets, but movements in industrial securities were mostly moderate in character. Imperial Chemical at 39s. 3d. were well maintained on balance, while Lever & Unilever rallied to 33s. 6d., and there was further improvement to 37s. 3d. in Dunlop Rubber. Among shares influenced by dividend announcements, Allied Ironfounders recovered part of an earlier sharp reaction but, compared with a week ago, have shown a decline from 50s. to 48s. on balance. Barry & Staines at 40s. have recovered from an earlier decline; the yield on the basis of the smaller dividend is very moderate, but, as in many other instances, the main influence governing market values is the possible scope for recovery in profits and dividends after the war. Nairn & Greenwich at 66s. 3d. were unchanged, awaiting the interim dividend,

but elsewhere Borax Consolidated have eased from 33s. 9d. to 33s. 6d., and Amalgamated Metal to 17s. 3d. The units of the Distillers Co. were lower at 83s. but are now "ex" the recently-declared dividend. On the other hand, United Molasses 6s. 8d. units were firm and close on 29s., it being pointed out that there is an apparently attractive yield on the basis of last year's distribution. Turner & Newall ordinary, which continued to attract attention on the assumption that higher profits may rule after the war, were 77s. 6d., compared with 76s. a week ago.

Business at 55s. 7½d. was recorded at one time in W. J. Bush. Fisons were around 47s., and B. Laporte again quoted at 78s. Associated Cement were lower at 57s.; the full report shows a reduction in trading profits, but this is virtually offset by lower charges for E.P.T., etc., and net profits are, therefore, little changed compared with a year ago. British Plaster Board reacted on the preliminary statement for the past year's working, and were 27s. 3d. compared with 29s. 3d. a week ago, but part of the decline reflects deduction of the final dividend from the price.

Movements in iron and steel securities were small. Tube Investments were 90s. 9d. compared with 91s. 3d. a week ago, while Stewarts & Lloyds were virtually unchanged at 50s. 4½d., as were United Steel at 25s. 6d. Dorman Long eased to 26s. 7½d., and Babcock & Wilcox to 47s. 7½d. In other directions, Monsanto Chemicals 5½ per cent. preference were again 22s. 6d. Morgan Crucible first and second preference were around 27s. and 24s. respectively and were held firmly on yield considerations and the increased cover for dividend requirements shown by the recently-issued results. Burt Boulton were 19s., and General Refractories 10s. shares 15s. 7½d., while Goodlass Wall 10s. ordinary again changed hands around 14s. 6d. Thomas De La Rue have not held best prices but were active around £6¾, having remained under the influence of the dividend and the possibilities that may attach to the plastics side of the business. Lewis Berger were higher at 88s. 9d., plastics developments also having influenced sentiment in this case. British Industrial Plastics 2s. ordinary were 5s. 10½d., and Erinoid 5s. ordinary were again 11s. 6d. In other directions, Gas Light and Coke ordinary held their recent improvement to 18s. 3d. British Glues and Chemicals 4s. shares were maintained at 7s. 1½d.

Boots Drug eased to 40s. 3d., compared with 40s. 9d. a week ago. Business at close on 31s. was recorded in Southalls (Birmingham) 5s. shares. At 29s. 7½d. Timothy Whites were better on balance, and Sangers 5s. ordinary were again 20s. 4½d. Dealings around 6s. 10½d. were shown in Greeff-Chemicals 5s. ordinary. Textile shares were more active and Courtaulds moved up strongly to 53s. 3d., awaiting the interim dividend statement. British Celanese were better at 21s. 9d., but elsewhere Bleachers preference eased to 16s. 9d. Oil shares reflected the trend of markets earlier in the week, and gains on balance were shown in Trinidad Leaseholds, Burmah Oil, and "Shell," but best prices were not fully held.

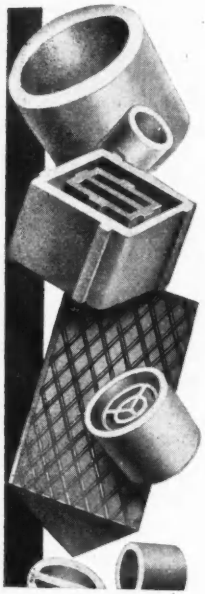
British Chemical Prices

Market Reports

LITTLE change falls to be recorded in the London general chemicals market this week, and a difficult supply position continues for many products. The movement under existing contracts remains substantial and a steady flow of deliveries is maintained. In regard to new business, supplies of a number of products are much below current demand and a firm tone is in evidence for those chemicals for which reasonable quantities are on offer. In the soda products section a steady inquiry is reported for bicarbonate of soda, Glauber salt and salt cake, while caustic soda and chlorate of soda are strong items. Acetate of soda is a firm market and a ready outlet is reported for offers of bichromate of soda. Trade in the potash section of the market is steady, a tightness in supplies being the chief feature. In other sections of the market barium carbonate is in steady request and formaldehyde is attracting a fair amount of attention, while a good demand is reported for alum lump at unchanged rates. White powdered arsenic is active and the market firm. Trade in the coal-tar products market shows little change; there is a steady inquiry for cresylic and carbolic acid and for creosote oil, while a fair business is being transacted in the benzols, xylols, and toluols. Pitch remains steady.

MANCHESTER.—Generally speaking, the movement of contract supplies of heavy chemicals on the Manchester market during the past week seems to have been only slightly affected by holiday conditions in Lancashire, but these will become a growing influence from now on until the end of August. In the meantime, however, delivery specifications for the general run of soda compounds are covering good quantities, and there has been a fairly steady demand for the ammonia and magnesia products. There are ready buyers for the limited parcels of potash chemicals available here, while a brisk demand for most of the acid products is a feature.

GLASGOW.—There is no actual change in the position in the Scottish heavy chemical trade during the past week. Home business remains steady. Export inquiries are rather limited. Prices remain very firm.



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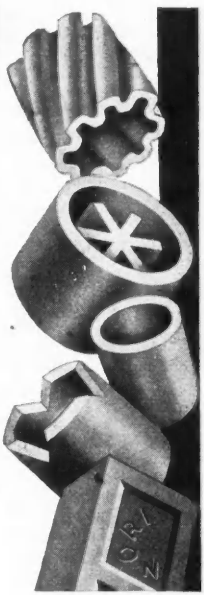

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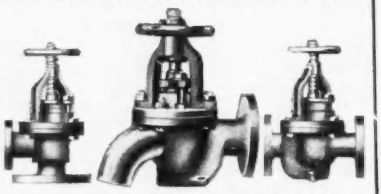

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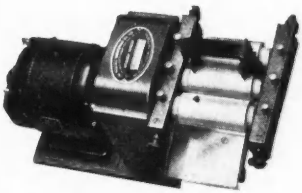

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Printed in Great Britain by THE PRESS AT COOMBELANDS., London and Addlestone, and published by BENN BROTHERS, LTD., at Bouverie House, 154, Fleet Street, E.C.4., July 10th, 1943. Entered as Second Class Matter at the New York, U.S.A., Post Office.